



SECOND SUBSTITUTE SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT: Pulst, Stefan M

(ii) TITLE OF INVENTION: NUCLEIC ACID ENCODING SPINOCEREBELLAR  
ATAXIA-2 AND PRODUCTS RELATED THERETO

(iii) NUMBER OF SEQUENCES: 19

(iv) CORRESPONDENCE ADDRESS:

- (A) ADDRESSEE: Muetting, Raasch & Gebhardt, P.A.
- (B) STREET: 119 North Fourth Street
- (C) CITY: Minneapolis
- (D) STATE: Minnesota
- (E) COUNTRY: USA
- (F) ZIP: 55401

(v) COMPUTER READABLE FORM:

- (A) MEDIUM TYPE: Floppy disk
- (B) COMPUTER: IBM PC compatible
- (C) OPERATING SYSTEM: PC-DOS/MS-DOS
- (D) SOFTWARE: PatentIn Release #1.0, Version #1.30

(vi) CURRENT APPLICATION DATA:

- (A) APPLICATION NUMBER: US 08/727,084
- (B) FILING DATE: 08-OCT-1996
- (C) CLASSIFICATION:

(viii) ATTORNEY/AGENT INFORMATION:

- (A) NAME: Muetting, Ann M.
- (B) REGISTRATION NUMBER: 33,977
- (C) REFERENCE/DOCKET NUMBER: 232.00010101

(ix) TELECOMMUNICATION INFORMATION:

- (A) TELEPHONE: 612/305-1220
- (B) TELEFAX: 612/305-1228

(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 516 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: both

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

TTGGTAGCAA CGGAAACGGC GCGGCGCGCT TTCGGCCCGG CTCCCGGCGG CTCCTTGGTC	60
TCGGCGGGCC TCCCCGCCCC TTCGTCTGTC TCCTTCTCCC CCTCGCCAGC CCGGGCGCCC	120
CTCCGGCCGC GCCAACCCGC GCCTCCCCGC TCGGCGCCCG TCGGTCCCCG CCGCGTTCCG	180
GCGTCTCCTT GCGCGCCCCG GCTCCCGGCT GTCCCCGCC GCGGTGCGAG CCGGTGTATG	240
GGCCCCTCAC CATGTCGCTG AAGCCCCAGC AGCAGCAGCA GCAGCAGCAG CAACAGCAGC	300
AGCAGCAACA GCAGCAGCAG CAGCAGCAGC AGCCGCCGCC CGCGGCTGCC AATGTCCGCA	360
AGCCCGGCGG CAGCGGCCTT CTAGCGTCGC CCGCCGCCGC GCCTTCGCCG TCCTCGTCTT	420
CGGTCTCCTC GTCCTCGGCC ACGGCTCCCT CCTCGGTGGT CGCGGCGACC TCCGGCGGCG	480
GGAGGCCCGG CCTGGGCAGG TGGGTGTCGG CACCCC	516

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 4481 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: both

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 163..4101

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

ACCCCCGAGA AAGCAACCCA GCGCGCCGCC CGCTCCTCAC GTGTCCCTCC CGGCCCCGGG	60
GCCACCTCAC GTTCTGCTTC CGTCTGACCC CTCCGACTTC CGGTAAAGAG TCCCTATCCG	120
CACCTCCGCT CCCACCCGGC GCCTCGGCGC GCCCGCCCTC CG ATG CGC TCA GCG	174
Met Arg Ser Ala	
1	
GCC GCA GCT CCT CGG AGT CCC GCG GTG GCC ACC GAG TCT CGC CGC TTC	222
Ala Ala Ala Pro Arg Ser Pro Ala Val Ala Thr Glu Ser Arg Arg Phe	
5 10 15 20	

GCC GCA GCC AGG TGG CCC GGG TGG CGC TCG CTC CAG CGG CCG GCG CGG	270
Ala Ala Ala Arg Trp Pro Gly Trp Arg Ser Leu Gln Arg Pro Ala Arg	
25 30 35	
CGG AGC GGG CGG GGC GGC GGT GGC GCG GCC CCG GGA CCG TAT CCC TCC	318
Arg Ser Gly Arg Gly Gly Gly Gly Ala Ala Pro Gly Pro Tyr Pro Ser	
40 45 50	
GCC GCC CCT CCC CCG CCC GGC CCC GGC CCC CCT CCC TCC CGG CAG AGC	366
Ala Ala Pro Pro Pro Pro Gly Pro Gly Pro Pro Pro Ser Arg Gln Ser	
55 60 65	
TCG CCT CCC TCC GCC TCA GAC TGT TTT GGT AGC AAC GGC AAC GGC GGC	414
Ser Pro Pro Ser Ala Ser Asp Cys Phe Gly Ser Asn Gly Asn Gly Gly	
70 75 80	
GGC GCG TTT CGG CCC GGC TCC CGG CGG CTC CTT GGT CTC GGC GGG CCT	462
Gly Ala Phe Arg Pro Gly Ser Arg Arg Leu Leu Gly Leu Gly Gly Pro	
85 90 95 100	
CCC CGC CCC TTC GTC GTC GTC CTT CTC CCC CTC GCC AGC CCG GGC GCC	510
Pro Arg Pro Phe Val Val Val Leu Leu Pro Leu Ala Ser Pro Gly Ala	
105 110 115	
CCT CCG GCC GCG CCA ACC CGC GCC TCC CCG CTC GGC GCC CGT GCG TCC	558
Pro Pro Ala Ala Pro Thr Arg Ala Ser Pro Leu Gly Ala Arg Ala Ser	
120 125 130	
CCG CCG CGT TCC GGC GTC TCC TTG GCG CGC CCG GCT CCC GGC TGT CCC	606
Pro Pro Arg Ser Gly Val Ser Leu Ala Arg Pro Ala Pro Gly Cys Pro	
135 140 145	
CGC CCG GCG TGC GAG CCG GTG TAT GGG CCC CTC ACC ATG TCG CTG AAG	654
Arg Pro Ala Cys Glu Pro Val Tyr Gly Pro Leu Thr Met Ser Leu Lys	
150 155 160	
CCC CAG CAG CAG CAG CAG CAG CAG CAG CAA CAG CAG CAG CAG CAA CAG	702
Pro Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln	
165 170 175 180	
CAG CAG CAG CAG CAG CAG CAG CCG CCG CCC GCG GCT GCC AAT GTC CGC	750
Gln Gln Gln Gln Gln Gln Gln Pro Pro Pro Ala Ala Ala Asn Val Arg	
185 190 195	
AAG CCC GGC GGC AGC GGC CTT CTA GCG TCG CCC GCC GCC GCG CCT TCG	798
Lys Pro Gly Gly Ser Gly Leu Leu Ala Ser Pro Ala Ala Ala Pro Ser	
200 205 210	
CCG TCC TCG TCC TCG GTC TCC TCG TCC TCG GCC ACG GCT CCC TCC TCG	846
Pro Ser Ser Ser Ser Val Ser Ser Ser Ser Ala Thr Ala Pro Ser Ser	
215 220 225	

GTG GTC GCG GCG ACC TCC GGC GGC GGG AGG CCC GGC CTG GGC AGA GGT Val Val Ala Ala Thr Ser Gly Gly Gly Arg Pro Gly Leu Gly Arg Gly 230 235 240	894
CGA AAC AGT AAC AAA GGA CTG CCT CAG TCT ACG ATT TCT TTT GAT GGA Arg Asn Ser Asn Lys Gly Leu Pro Gln Ser Thr Ile Ser Phe Asp Gly 245 250 255 260	942
ATC TAT GCA AAT ATG AGG ATG GTT CAT ATA CTT ACA TCA GTT GTT GGC Ile Tyr Ala Asn Met Arg Met Val His Ile Leu Thr Ser Val Val Gly 265 270 275	990
TCC AAA TGT GAA GTA CAA GTG AAA AAT GGA GGT ATA TAT GAA GGA GTT Ser Lys Cys Glu Val Gln Val Lys Asn Gly Gly Ile Tyr Glu Gly Val 280 285 290	1038
TTT AAA ACT TAC AGT CCG AAG TGT GAT TTG GTA CTT GAT GCC GCA CAT Phe Lys Thr Tyr Ser Pro Lys Cys Asp Leu Val Leu Asp Ala Ala His 295 300 305	1086
GAG AAA AGT ACA GAA TCC AGT TCG GGG CCG AAA CGT GAA GAA ATA ATG Glu Lys Ser Thr Glu Ser Ser Ser Gly Pro Lys Arg Glu Glu Ile Met 310 315 320	1134
GAG AGT ATT TTG TTC AAA TGT TCA GAC TTT GTT GTG GTA CAG TTT AAA Glu Ser Ile Leu Phe Lys Cys Ser Asp Phe Val Val Val Gln Phe Lys 325 330 335 340	1182
GAT ATG GAC TCC AGT TAT GCA AAA AGA GAT GCT TTT ACT GAC TCT GCT Asp Met Asp Ser Ser Tyr Ala Lys Arg Asp Ala Phe Thr Asp Ser Ala 345 350 355	1230
ATC AGT GCT AAA GTG AAT GGC GAA CAC AAA GAG AAG GAC CTG GAG CCC Ile Ser Ala Lys Val Asn Gly Glu His Lys Glu Lys Asp Leu Glu Pro 360 365 370	1278
TGG GAT GCA GGT GAA CTC ACA GCC AAT GAG GAA CTT GAG GCT TTG GAA Trp Asp Ala Gly Glu Leu Thr Ala Asn Glu Glu Leu Glu Ala Leu Glu 375 380 385	1326
AAT GAC GTA TCT AAT GGA TGG GAT CCC AAT GAT ATG TTT CGA TAT AAT Asn Asp Val Ser Asn Gly Trp Asp Pro Asn Asp Met Phe Arg Tyr Asn 390 395 400	1374
GAA GAA AAT TAT GGT GTA GTG TCT ACG TAT GAT AGC AGT TTA TCT TCG Glu Glu Asn Tyr Gly Val Val Ser Thr Tyr Asp Ser Ser Leu Ser Ser 405 410 415 420	1422
TAT ACA GTG CCC TTA GAA AGA GAT AAC TCA GAA GAA TTT TTA AAA CGG Tyr Thr Val Pro Leu Glu Arg Asp Asn Ser Glu Glu Phe Leu Lys Arg 425 430 435	1470

GAA GCA AGG GCA AAC CAG TTA GCA GAA GAA ATT GAG TCA AGT GCC CAG	1518
Glu Ala Arg Ala Asn Gln Leu Ala Glu Glu Ile Glu Ser Ser Ala Gln	
440 445 450	
TAC AAA GCT CGA GTG GCC CTG GAA AAT GAT GAT AGG AGT GAG GAA GAA	1566
Tyr Lys Ala Arg Val Ala Leu Glu Asn Asp Asp Arg Ser Glu Glu Glu	
455 460 465	
AAA TAC ACA GCA GTT CAG AGA AAT TCC AGT GAA CGT GAG GGG CAC AGC	1614
Lys Tyr Thr Ala Val Gln Arg Asn Ser Ser Glu Arg Glu Gly His Ser	
470 475 480	
ATA AAC ACT AGG GAA AAT AAA TAT ATT CCT CCT GGA CAA AGA AAT AGA	1662
Ile Asn Thr Arg Glu Asn Lys Tyr Ile Pro Pro Gly Gln Arg Asn Arg	
485 490 495 500	
GAA GTC ATA TCC TGG GGA AGT GGG AGA CAG AAT TCA CCG CGT ATG GGC	1710
Glu Val Ile Ser Trp Gly Ser Gly Arg Gln Asn Ser Pro Arg Met Gly	
505 510 515	
CAG CCT GGA TCG GGC TCC ATG CCA TCA AGA TCC ACT TCT CAC ACT TCA	1758
Gln Pro Gly Ser Gly Ser Met Pro Ser Arg Ser Thr Ser His Thr Ser	
520 525 530	
GAT TTC AAC CCG AAT TCT GGT TCA GAC CAA AGA GTA GTT AAT GGA GGT	1806
Asp Phe Asn Pro Asn Ser Gly Ser Asp Gln Arg Val Val Asn Gly Gly	
535 540 545	
GTT CCC TGG CCA TCG CCT TGC CCA TCT CCT TCC TCT CGC CCA CCT TCT	1854
Val Pro Trp Pro Ser Pro Cys Pro Ser Pro Ser Ser Arg Pro Pro Ser	
550 555 560	
CGC TAC CAG TCA GGT CCC AAC TCT CTT CCA CCT CGG GCA GCC ACC CCT	1902
Arg Tyr Gln Ser Gly Pro Asn Ser Leu Pro Pro Arg Ala Ala Thr Pro	
565 570 575 580	
ACA CGG CCG CCC TCC AGG CCC CCC TCG CGG CCA TCC AGA CCC CCG TCT	1950
Thr Arg Pro Pro Ser Arg Pro Pro Ser Arg Pro Ser Arg Pro Pro Ser	
585 590 595	
CAC CCC TCT GCT CAT GGT TCT CCA GCT CCT GTC TCT ACT ATG CCT AAA	1998
His Pro Ser Ala His Gly Ser Pro Ala Pro Val Ser Thr Met Pro Lys	
600 605 610	
CGC ATG TCT TCA GAA GGG CCT CCA AGG ATG TCC CCA AAG GCC CAG CGA	2046
Arg Met Ser Ser Glu Gly Pro Pro Arg Met Ser Pro Lys Ala Gln Arg	
615 620 625	
CAT CCT CGA AAT CAC AGA GTT TCT GCT GGG AGG GGT TCC ATA TCC AGT	2094
His Pro Arg Asn His Arg Val Ser Ala Gly Arg Gly Ser Ile Ser Ser	
630 635 640	

GGC CTA GAA TTT GTA TCC CAC AAC CCA CCC AGT GAA GCA GCT ACT CCT	2142
Gly Leu Glu Phe Val Ser His Asn Pro Pro Ser Glu Ala Ala Thr Pro	
645 650 655 660	
CCA GTA GCA AGG ACC AGT CCC TCG GGG GGA ACG TGG TCA TCA GTG GTC	2190
Pro Val Ala Arg Thr Ser Pro Ser Gly Gly Thr Trp Ser Ser Val Val	
665 670 675	
AGT GGG GTT CCA AGA TTA TCC CCT AAA ACT CAT AGA CCC AGG TCT CCC	2238
Ser Gly Val Pro Arg Leu Ser Pro Lys Thr His Arg Pro Arg Ser Pro	
680 685 690	
AGA CAG AAC AGT ATT GGA AAT ACC CCC AGT GGG CCA GTT CTT GCT TCT	2286
Arg Gln Asn Ser Ile Gly Asn Thr Pro Ser Gly Pro Val Leu Ala Ser	
695 700 705	
CCC CAA GCT GGT ATT ATT CCA ACT GAA GCT GTT GCC ATG CCT ATT CCA	2334
Pro Gln Ala Gly Ile Ile Pro Thr Glu Ala Val Ala Met Pro Ile Pro	
710 715 720	
GCT GCA TCT CCT ACG CCT GCT AGT CCT GCA TCG AAC AGA GCT GTT ACC	2382
Ala Ala Ser Pro Thr Pro Ala Ser Pro Ala Ser Asn Arg Ala Val Thr	
725 730 735 740	
CCT TCT AGT GAG GCT AAA GAT TCC AGG CTT CAA GAT CAG AGG CAG AAC	2430
Pro Ser Ser Glu Ala Lys Asp Ser Arg Leu Gln Asp Gln Arg Gln Asn	
745 750 755	
TCT CCT GCA GGG AAT AAA GAA AAT ATT AAA CCC AAT GAA ACA TCA CCT	2478
Ser Pro Ala Gly Asn Lys Glu Asn Ile Lys Pro Asn Glu Thr Ser Pro	
760 765 770	
AGC TTC TCA AAA GCT GAA AAC AAA GGT ATA TCA CCA GTT GTT TCT GAA	2526
Ser Phe Ser Lys Ala Glu Asn Lys Gly Ile Ser Pro Val Val Ser Glu	
775 780 785	
CAT AGA AAA CAG ATT GAT GAT TTA AAG AAA TTT AAG AAT GAT TTT AGG	2574
His Arg Lys Gln Ile Asp Asp Leu Lys Lys Phe Lys Asn Asp Phe Arg	
790 795 800	
TTA CAG CCA AGT TCT ACT TCT GAA TCT ATG GAT CAA CTA CTA AAC AAA	2622
Leu Gln Pro Ser Ser Thr Ser Glu Ser Met Asp Gln Leu Leu Asn Lys	
805 810 815 820	
AAT AGA GAG GGA GAA AAA TCA AGA GAT TTG ATC AAA GAC AAA ATT GAA	2670
Asn Arg Glu Gly Glu Lys Ser Arg Asp Leu Ile Lys Asp Lys Ile Glu	
825 830 835	
CCA AGT GCT AAG GAT TCT TTC ATT GAA AAT AGC AGC AGC AAC TGT ACC	2718
Pro Ser Ala Lys Asp Ser Phe Ile Glu Asn Ser Ser Ser Asn Cys Thr	
840 845 850	

AGT GGC AGC AGC AAG CCG AAT AGC CCC AGC ATT TCC CCT TCA ATA CTT	2766
Ser Gly Ser Ser Lys Pro Asn Ser Pro Ser Ile Ser Pro Ser Ile Leu	
855 860 865	
AGT AAC ACG GAG CAC AAG AGG GGA CCT GAG GTC ACT TCC CAA GGG GTT	2814
Ser Asn Thr Glu His Lys Arg Gly Pro Glu Val Thr Ser Gln Gly Val	
870 875 880	
CAG ACT TCC AGC CCA GCA TGT AAA CAA GAG AAA GAC GAT AAG GAA GAG	2862
Gln Thr Ser Ser Pro Ala Cys Lys Gln Glu Lys Asp Asp Lys Glu Glu	
885 890 895 900	
AAG AAA GAC GCA GCT GAG CAA GTT AGG AAA TCA ACA TTG AAT CCC AAT	2910
Lys Lys Asp Ala Ala Glu Gln Val Arg Lys Ser Thr Leu Asn Pro Asn	
905 910 915	
GCA AAG GAG TTC AAC CCA CGT TCC TTC TCT CAG CCA AAG CCT TCT ACT	2958
Ala Lys Glu Phe Asn Pro Arg Ser Phe Ser Gln Pro Lys Pro Ser Thr	
920 925 930	
ACC CCA ACT TCA CCT CGG CCT CAA GCA CAA CCT AGC CCA TCT ATG GTG	3006
Thr Pro Thr Ser Pro Arg Pro Gln Ala Gln Pro Ser Pro Ser Met Val	
935 940 945	
GGT CAT CAA CAG CCA ACT CCA GTT TAT ACT CAG CCT GTT TGT TTT GCA	3054
Gly His Gln Gln Pro Thr Pro Val Tyr Thr Gln Pro Val Cys Phe Ala	
950 955 960	
CCA AAT ATG ATG TAT CCA GTC CCA GTG AGC CCA GGC GTG CAA CCT TTA	3102
Pro Asn Met Met Tyr Pro Val Pro Val Ser Pro Gly Val Gln Pro Leu	
965 970 975 980	
TAC CCA ATA CCT ATG ACG CCC ATG CCA GTG AAT CAA GCC AAG ACA TAT	3150
Tyr Pro Ile Pro Met Thr Pro Met Pro Val Asn Gln Ala Lys Thr Tyr	
985 990 995	
AGA GCA GTA CCA AAT ATG CCC CAA CAG CGG CAA GAC CAG CAT CAT CAG	3198
Arg Ala Val Pro Asn Met Pro Gln Gln Arg Gln Asp Gln His His Gln	
1000 1005 1010	
AGT GCC ATG ATG CAC CCA GCG TCA GCA GCG GGC CCA CCG ATT GCA GCC	3246
Ser Ala Met Met His Pro Ala Ser Ala Ala Gly Pro Pro Ile Ala Ala	
1015 1020 1025	
ACC CCA CCA GCT TAC TCC ACG CAA TAT GTT GCC TAC AGT CCT CAG CAG	3294
Thr Pro Pro Ala Tyr Ser Thr Gln Tyr Val Ala Tyr Ser Pro Gln Gln	
1030 1035 1040	
TTC CCA AAT CAG CCC CTT GTT CAG CAT GTG CCA CAT TAT CAG TCT CAG	3342
Phe Pro Asn Gln Pro Leu Val Gln His Val Pro His Tyr Gln Ser Gln	
1045 1050 1055 1060	

CAT CCT CAT GTC TAT AGT CCT GTA ATA CAG GGT AAT GCT AGA ATG ATG	3390
His Pro His Val Tyr Ser Pro Val Ile Gln Gly Asn Ala Arg Met Met	
1065 1070 1075	
GCA CCA CCA ACA CAC GCC CAG CCT GGT TTA GTA TCT TCT TCA GCA ACT	3438
Ala Pro Pro Thr His Ala Gln Pro Gly Leu Val Ser Ser Ser Ala Thr	
1080 1085 1090	
CAG TAC GGG GCT CAT GAG CAG ACG CAT GCG ATG TAT GCA TGT CCC AAA	3486
Gln Tyr Gly Ala His Glu Gln Thr His Ala Met Tyr Ala Cys Pro Lys	
1095 1100 1105	
TTA CCA TAC AAC AAG GAG ACA AGC CCT TCT TTC TAC TTT GCC ATT TCC	3534
Leu Pro Tyr Asn Lys Glu Thr Ser Pro Ser Phe Tyr Phe Ala Ile Ser	
1110 1115 1120	
ACG GGC TCC CTT GCT CAG CAG TAT GCG CAC CCT AAC GCT ACC CTG CAC	3582
Thr Gly Ser Leu Ala Gln Gln Tyr Ala His Pro Asn Ala Thr Leu His	
1125 1130 1135 1140	
CCA CAT ACT CCA CAC CCT CAG CCT TCA GCT ACC CCC ACT GGA CAG CAG	3630
Pro His Thr Pro His Pro Gln Pro Ser Ala Thr Pro Thr Gly Gln Gln	
1145 1150 1155	
CAA AGC CAA CAT GGT GGA AGT CAT CCT GCA CCC AGT CCT GTT CAG CAC	3678
Gln Ser Gln His Gly Gly Ser His Pro Ala Pro Ser Pro Val Gln His	
1160 1165 1170	
CAT CAG CAC CAG GCC GCC CAG GCT CTC CAT CTG GCC AGT CCA CAG CAG	3726
His Gln His Gln Ala Ala Gln Ala Leu His Leu Ala Ser Pro Gln Gln	
1175 1180 1185	
CAG TCA GCC ATT TAC CAC GCG GGG CTT GCG CCA ACT CCA CCC TCC ATG	3774
Gln Ser Ala Ile Tyr His Ala Gly Leu Ala Pro Thr Pro Pro Ser Met	
1190 1195 1200	
ACA CCT GCC TCC AAC ACG CAG TCG CCA CAG AAT AGT TTC CCA GCA GCA	3822
Thr Pro Ala Ser Asn Thr Gln Ser Pro Gln Asn Ser Phe Pro Ala Ala	
1205 1210 1215 1220	
CAA CAG ACT GTC TTT ACG ATC CAT CCT TCT CAC GTT CAG CCG GCG TAT	3870
Gln Gln Thr Val Phe Thr Ile His Pro Ser His Val Gln Pro Ala Tyr	
1225 1230 1235	
ACC AAC CCA CCC CAC ATG GCC CAC GTA CCT CAG GCT CAT GTA CAG TCA	3918
Thr Asn Pro Pro His Met Ala His Val Pro Gln Ala His Val Gln Ser	
1240 1245 1250	
GGA ATG GTT CCT TCT CAT CCA ACT GCC CAT GCG CCA ATG ATG CTA ATG	3966
Gly Met Val Pro Ser His Pro Thr Ala His Ala Pro Met Met Leu Met	
1255 1260 1265	



ACG ACA CAG CCA CCC GGC GGT CCC CAG GCC GCC CTC GCT CAA AGT GCA	4014
Thr Thr Gln Pro Pro Gly Gly Pro Gln Ala Ala Leu Ala Gln Ser Ala	
1270 1275 1280	
CTA CAG CCC ATT CCA GTC TCG ACA ACA GCG CAT TTC CCC TAT ATG ACG	4062
Leu Gln Pro Ile Pro Val Ser Thr Thr Ala His Phe Pro Tyr Met Thr	
1285 1290 1295 1300	
CAC CCT TCA GTA CAA GCC CAC CAC CAA CAG CAG TTG TAAGGCTGCC	4108
His Pro Ser Val Gln Ala His His Gln Gln Gln Leu	
1305 1310	
CTGGAGGAAC CGAAAGGCCA AATTCCTCC TCCCTTCTAC TGCTTCTACC AACTGGAAGC	4168
ACAGAAAACT AGAATTTTCAT TTATTTTGT TTTAAAATAT ATATGTTGAT TTCTTGTAAC	4228
ATCCAATAGG AATGCTAACA GTTCACTTGC AGTGGAAGAT ACTTGGACCG AGTAGAGGCA	4288
TTTAGGAACT TGGGGGCTAT TCCATAATTC CATATGCTGT TTCAGAGTCC CGCAGGTACC	4348
CCAGCTCTGC TTGCCGAAAC TGGAAGTTAT TTATTTTTTTA ATAACCCTTG AAAGTCATGA	4408
ACACATCAGC TAGCAAAAGA AGTAACAAGA GTGATTCTTG CTGCTATTAC TGCTAAAAAA	4468
AAAAAAAAAA AAA	4481

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1312 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

Met Arg Ser Ala Ala Ala Ala Pro Arg Ser Pro Ala Val Ala Thr Glu	
1 5 10 15	
Ser Arg Arg Phe Ala Ala Ala Arg Trp Pro Gly Trp Arg Ser Leu Gln	
20 25 30	
Arg Pro Ala Arg Arg Ser Gly Arg Gly Gly Gly Gly Ala Ala Pro Gly	
35 40 45	
Pro Tyr Pro Ser Ala Ala Pro Pro Pro Pro Gly Pro Gly Pro Pro Pro	
50 55 60	

Ser	Arg	Gln	Ser	Ser	Pro	Pro	Ser	Ala	Ser	Asp	Cys	Phe	Gly	Ser	Asn	65	70	75	80
Gly	Asn	Gly	Gly	Gly	Ala	Phe	Arg	Pro	Gly	Ser	Arg	Arg	Leu	Leu	Gly	85	90	95	
Leu	Gly	Gly	Pro	Pro	Arg	Pro	Phe	Val	Val	Val	Leu	Leu	Pro	Leu	Ala	100	105	110	
Ser	Pro	Gly	Ala	Pro	Pro	Ala	Ala	Pro	Thr	Arg	Ala	Ser	Pro	Leu	Gly	115	120	125	
Ala	Arg	Ala	Ser	Pro	Pro	Arg	Ser	Gly	Val	Ser	Leu	Ala	Arg	Pro	Ala	130	135	140	
Pro	Gly	Cys	Pro	Arg	Pro	Ala	Cys	Glu	Pro	Val	Tyr	Gly	Pro	Leu	Thr	145	150	155	160
Met	Ser	Leu	Lys	Pro	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	165	170	175	
Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Pro	Pro	Pro	Ala	Ala	180	185	190	
Ala	Asn	Val	Arg	Lys	Pro	Gly	Gly	Ser	Gly	Leu	Leu	Ala	Ser	Pro	Ala	195	200	205	
Ala	Ala	Pro	Ser	Pro	Ser	Ser	Ser	Ser	Val	Ser	Ser	Ser	Ser	Ala	Thr	210	215	220	
Ala	Pro	Ser	Ser	Val	Val	Ala	Ala	Thr	Ser	Gly	Gly	Gly	Arg	Pro	Gly	225	230	235	240
Leu	Gly	Arg	Gly	Arg	Asn	Ser	Asn	Lys	Gly	Leu	Pro	Gln	Ser	Thr	Ile	245	250	255	
Ser	Phe	Asp	Gly	Ile	Tyr	Ala	Asn	Met	Arg	Met	Val	His	Ile	Leu	Thr	260	265	270	
Ser	Val	Val	Gly	Ser	Lys	Cys	Glu	Val	Gln	Val	Lys	Asn	Gly	Gly	Ile	275	280	285	
Tyr	Glu	Gly	Val	Phe	Lys	Thr	Tyr	Ser	Pro	Lys	Cys	Asp	Leu	Val	Leu	290	295	300	
Asp	Ala	Ala	His	Glu	Lys	Ser	Thr	Glu	Ser	Ser	Ser	Gly	Pro	Lys	Arg	305	310	315	320
Glu	Glu	Ile	Met	Glu	Ser	Ile	Leu	Phe	Lys	Cys	Ser	Asp	Phe	Val	Val	325	330	335	

Val Gln Phe Lys Asp Met Asp Ser Ser Tyr Ala Lys Arg Asp Ala Phe  
340 345 350  
Thr Asp Ser Ala Ile Ser Ala Lys Val Asn Gly Glu His Lys Glu Lys  
355 360 365  
Asp Leu Glu Pro Trp Asp Ala Gly Glu Leu Thr Ala Asn Glu Glu Leu  
370 375 380  
Glu Ala Leu Glu Asn Asp Val Ser Asn Gly Trp Asp Pro Asn Asp Met  
385 390 395 400  
Phe Arg Tyr Asn Glu Glu Asn Tyr Gly Val Val Ser Thr Tyr Asp Ser  
405 410 415  
Ser Leu Ser Ser Tyr Thr Val Pro Leu Glu Arg Asp Asn Ser Glu Glu  
420 425 430  
Phe Leu Lys Arg Glu Ala Arg Ala Asn Gln Leu Ala Glu Glu Ile Glu  
435 440 445  
Ser Ser Ala Gln Tyr Lys Ala Arg Val Ala Leu Glu Asn Asp Asp Arg  
450 455 460  
Ser Glu Glu Glu Lys Tyr Thr Ala Val Gln Arg Asn Ser Ser Glu Arg  
465 470 475 480  
Glu Gly His Ser Ile Asn Thr Arg Glu Asn Lys Tyr Ile Pro Pro Gly  
485 490 495  
Gln Arg Asn Arg Glu Val Ile Ser Trp Gly Ser Gly Arg Gln Asn Ser  
500 505 510  
Pro Arg Met Gly Gln Pro Gly Ser Gly Ser Met Pro Ser Arg Ser Thr  
515 520 525  
Ser His Thr Ser Asp Phe Asn Pro Asn Ser Gly Ser Asp Gln Arg Val  
530 535 540  
Val Asn Gly Gly Val Pro Trp Pro Ser Pro Cys Pro Ser Pro Ser Ser  
545 550 555 560  
Arg Pro Pro Ser Arg Tyr Gln Ser Gly Pro Asn Ser Leu Pro Pro Arg  
565 570 575  
Ala Ala Thr Pro Thr Arg Pro Pro Ser Arg Pro Pro Ser Arg Pro Ser  
580 585 590  
Arg Pro Pro Ser His Pro Ser Ala His Gly Ser Pro Ala Pro Val Ser  
595 600 605

Thr	Met	Pro	Lys	Arg	Met	Ser	Ser	Glu	Gly	Pro	Pro	Arg	Met	Ser	Pro	610	615	620	
Lys	Ala	Gln	Arg	His	Pro	Arg	Asn	His	Arg	Val	Ser	Ala	Gly	Arg	Gly	625	630	635	640
Ser	Ile	Ser	Ser	Gly	Leu	Glu	Phe	Val	Ser	His	Asn	Pro	Pro	Ser	Glu	645	650	655	
Ala	Ala	Thr	Pro	Pro	Val	Ala	Arg	Thr	Ser	Pro	Ser	Gly	Gly	Thr	Trp	660	665	670	
Ser	Ser	Val	Val	Ser	Gly	Val	Pro	Arg	Leu	Ser	Pro	Lys	Thr	His	Arg	675	680	685	
Pro	Arg	Ser	Pro	Arg	Gln	Asn	Ser	Ile	Gly	Asn	Thr	Pro	Ser	Gly	Pro	690	695	700	
Val	Leu	Ala	Ser	Pro	Gln	Ala	Gly	Ile	Ile	Pro	Thr	Glu	Ala	Val	Ala	705	710	715	720
Met	Pro	Ile	Pro	Ala	Ala	Ser	Pro	Thr	Pro	Ala	Ser	Pro	Ala	Ser	Asn	725	730	735	
Arg	Ala	Val	Thr	Pro	Ser	Ser	Glu	Ala	Lys	Asp	Ser	Arg	Leu	Gln	Asp	740	745	750	
Gln	Arg	Gln	Asn	Ser	Pro	Ala	Gly	Asn	Lys	Glu	Asn	Ile	Lys	Pro	Asn	755	760	765	
Glu	Thr	Ser	Pro	Ser	Phe	Ser	Lys	Ala	Glu	Asn	Lys	Gly	Ile	Ser	Pro	770	775	780	
Val	Val	Ser	Glu	His	Arg	Lys	Gln	Ile	Asp	Asp	Leu	Lys	Lys	Phe	Lys	785	790	795	800
Asn	Asp	Phe	Arg	Leu	Gln	Pro	Ser	Ser	Thr	Ser	Glu	Ser	Met	Asp	Gln	805	810	815	
Leu	Leu	Asn	Lys	Asn	Arg	Glu	Gly	Glu	Lys	Ser	Arg	Asp	Leu	Ile	Lys	820	825	830	
Asp	Lys	Ile	Glu	Pro	Ser	Ala	Lys	Asp	Ser	Phe	Ile	Glu	Asn	Ser	Ser	835	840	845	
Ser	Asn	Cys	Thr	Ser	Gly	Ser	Ser	Lys	Pro	Asn	Ser	Pro	Ser	Ile	Ser	850	855	860	
Pro	Ser	Ile	Leu	Ser	Asn	Thr	Glu	His	Lys	Arg	Gly	Pro	Glu	Val	Thr	865	870	875	880

Ser Gln Gly Val Gln Thr Ser Ser Pro Ala Cys Lys Gln Glu Lys Asp  
 885 890 895

Asp Lys Glu Glu Lys Lys Asp Ala Ala Glu Gln Val Arg Lys Ser Thr  
 900 905 910

Leu Asn Pro Asn Ala Lys Glu Phe Asn Pro Arg Ser Phe Ser Gln Pro  
 915 920 925

Lys Pro Ser Thr Thr Pro Thr Ser Pro Arg Pro Gln Ala Gln Pro Ser  
 930 935 940

Pro Ser Met Val Gly His Gln Gln Pro Thr Pro Val Tyr Thr Gln Pro  
 945 950 955 960

Val Cys Phe Ala Pro Asn Met Met Tyr Pro Val Pro Val Ser Pro Gly  
 965 970 975

Val Gln Pro Leu Tyr Pro Ile Pro Met Thr Pro Met Pro Val Asn Gln  
 980 985 990

Ala Lys Thr Tyr Arg Ala Val Pro Asn Met Pro Gln Gln Arg Gln Asp  
 995 1000 1005

Gln His His Gln Ser Ala Met Met His Pro Ala Ser Ala Ala Gly Pro  
 1010 1015 1020

Pro Ile Ala Ala Thr Pro Pro Ala Tyr Ser Thr Gln Tyr Val Ala Tyr  
 1025 1030 1035 1040

Ser Pro Gln Gln Phe Pro Asn Gln Pro Leu Val Gln His Val Pro His  
 1045 1050 1055

Tyr Gln Ser Gln His Pro His Val Tyr Ser Pro Val Ile Gln Gly Asn  
 1060 1065 1070

Ala Arg Met Met Ala Pro Pro Thr His Ala Gln Pro Gly Leu Val Ser  
 1075 1080 1085

Ser Ser Ala Thr Gln Tyr Gly Ala His Glu Gln Thr His Ala Met Tyr  
 1090 1095 1100

Ala Cys Pro Lys Leu Pro Tyr Asn Lys Glu Thr Ser Pro Ser Phe Tyr  
 1105 1110 1115 1120

Phe Ala Ile Ser Thr Gly Ser Leu Ala Gln Gln Tyr Ala His Pro Asn  
 1125 1130 1135

Ala Thr Leu His Pro His Thr Pro His Pro Gln Pro Ser Ala Thr Pro  
 1140 1145 1150

Thr	Gly	Gln	Gln	Gln	Ser	Gln	His	Gly	Gly	Ser	His	Pro	Ala	Pro	Ser			
																1155	1160	1165
Pro	Val	Gln	His	His	Gln	His	Gln	Ala	Ala	Gln	Ala	Leu	His	Leu	Ala			
																1170	1175	1180
Ser	Pro	Gln	Gln	Gln	Ser	Ala	Ile	Tyr	His	Ala	Gly	Leu	Ala	Pro	Thr			
																1185	1190	1195 1200
Pro	Pro	Ser	Met	Thr	Pro	Ala	Ser	Asn	Thr	Gln	Ser	Pro	Gln	Asn	Ser			
																1205	1210	1215
Phe	Pro	Ala	Ala	Gln	Gln	Thr	Val	Phe	Thr	Ile	His	Pro	Ser	His	Val			
																1220	1225	1230
Gln	Pro	Ala	Tyr	Thr	Asn	Pro	Pro	His	Met	Ala	His	Val	Pro	Gln	Ala			
																1235	1240	1245
His	Val	Gln	Ser	Gly	Met	Val	Pro	Ser	His	Pro	Thr	Ala	His	Ala	Pro			
																1250	1255	1260
Met	Met	Leu	Met	Thr	Thr	Gln	Pro	Pro	Gly	Gly	Pro	Gln	Ala	Ala	Leu			
																1265	1270	1275 1280
Ala	Gln	Ser	Ala	Leu	Gln	Pro	Ile	Pro	Val	Ser	Thr	Thr	Ala	His	Phe			
																1285	1290	1295
Pro	Tyr	Met	Thr	His	Pro	Ser	Val	Gln	Ala	His	His	Gln	Gln	Gln	Leu			
																1300	1305	1310

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1257 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: both

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 2..1255

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

G CAC GAG GGG CCG CTC ACC ATG TCG CTG AAG CCG CAG CCG CAG CCG	46
His Glu Gly Pro Leu Thr Met Ser Leu Lys Pro Gln Pro Gln Pro	
1 5 10 15	
CCC GCG CCC GCC ACT GGC CGC AAG CCC GGC GGC GGC CTG CTC TCG TCG	94
Pro Ala Pro Ala Thr Gly Arg Lys Pro Gly Gly Gly Leu Leu Ser Ser	
20 25 30	
CCC GGC GCC GCG CCG GCC TCG GCC GCG GTG ACC TCG GCT TCC GTG GTG	142
Pro Gly Ala Ala Pro Ala Ser Ala Ala Val Thr Ser Ala Ser Val Val	
35 40 45	
CCG GCC CCG GCC GCG CCG GTG GCG TCT TCC TCG GCG GCC GCG GGC GGC	190
Pro Ala Pro Ala Ala Pro Val Ala Ser Ser Ser Ala Ala Ala Gly Gly	
50 55 60	
GGG CGT CCC GGC CTG GGC AGA GGT CGG AAC AGT AGC AAA GGA CTG CCT	238
Gly Arg Pro Gly Leu Gly Arg Gly Arg Asn Ser Ser Lys Gly Leu Pro	
65 70 75	
CAG CCT ACG ATT TCT TTT GAT GGA ATC TAT GCA AAC GTG AGG ATG GTT	286
Gln Pro Thr Ile Ser Phe Asp Gly Ile Tyr Ala Asn Val Arg Met Val	
80 85 90 95	
CAT ATA CTT ACG TCA GTT GTT GGA TCG AAA TGT GAA GTA CAA GTG AAA	334
His Ile Leu Thr Ser Val Val Gly Ser Lys Cys Glu Val Gln Val Lys	
100 105 110	
AAC GGA GGC ATA TAT GAA GGA GTT TTT AAA ACA TAC AGT CCT AAG TGT	382
Asn Gly Gly Ile Tyr Glu Gly Val Phe Lys Thr Tyr Ser Pro Lys Cys	
115 120 125	
GAC TTG GTA CTT GAT GCT GCA CAT GAG AAA AGT ACA GAA TCC AGT TCG	430
Asp Leu Val Leu Asp Ala Ala His Glu Lys Ser Thr Glu Ser Ser Ser	
130 135 140	
GGG CCA AAA CGT GAA GAA ATA ATG GAG AGT GTT TTG TTC AAA TGC TCA	478
Gly Pro Lys Arg Glu Glu Ile Met Glu Ser Val Leu Phe Lys Cys Ser	
145 150 155	
GAC TTC GTT GTG GTA CAG TTT AAA GAT ACA GAC TCC AGT TAT GCA CGG	526
Asp Phe Val Val Val Gln Phe Lys Asp Thr Asp Ser Ser Tyr Ala Arg	
160 165 170 175	
AGA GAT GCT TTT ACT GAC TCT GCT CTC AGC GCA AAG GTG AAT GGT GAG	574
Arg Asp Ala Phe Thr Asp Ser Ala Leu Ser Ala Lys Val Asn Gly Glu	
180 185 190	

CAC AAG GAG AAG GAC CTG GAG CCC TGG GAT GCA GGG GAG CTC ACG GCC	622
His Lys Glu Lys Asp Leu Glu Pro Trp Asp Ala Gly Glu Leu Thr Ala	
195 200 205	
AGC GAG GAG CTG GAG CTG GAG AAT GAT GTG TCT AAT GGA TGG GAC CCC	670
Ser Glu Glu Leu Glu Leu Glu Asn Asp Val Ser Asn Gly Trp Asp Pro	
210 215 220	
AAT GAC ATG TTT CGA TAT AAT GAA GAG AAT TAT GGT GTG GTG TCC ACA	718
Asn Asp Met Phe Arg Tyr Asn Glu Glu Asn Tyr Gly Val Val Ser Thr	
225 230 235	
TAT GAT AGC AGT TTA TCT TCA TAT ACG GTT CCT TTA GAA AGG GAC AAC	766
Tyr Asp Ser Ser Leu Ser Ser Tyr Thr Val Pro Leu Glu Arg Asp Asn	
240 245 250 255	
TCA GAA GAA TTT CTT AAA CGG GAG GCA AGG GCA AAC CAG TTA GCA GAA	814
Ser Glu Glu Phe Leu Lys Arg Glu Ala Arg Ala Asn Gln Leu Ala Glu	
260 265 270	
GAA ATT GAA TCC AGT GCT CAG TAC AAA GCT CGT GTC GCC CTT GAG AAT	862
Glu Ile Glu Ser Ser Ala Gln Tyr Lys Ala Arg Val Ala Leu Glu Asn	
275 280 285	
GAT GAC CGG AGT GAG GAA GAA AAA TAC ACA GCA GTC CAG AGA AAC TGC	910
Asp Asp Arg Ser Glu Glu Glu Lys Tyr Thr Ala Val Gln Arg Asn Cys	
290 295 300	
AGT GAC CGG GAG GGG CAT GGC CCC AAC ACT AGG GAC AAT AAA TAT ATT	958
Ser Asp Arg Glu Gly His Gly Pro Asn Thr Arg Asp Asn Lys Tyr Ile	
305 310 315	
CCT CCT GGA CAA AGA AAC AGA GAA GTC CTA TCC TGG GGA AGT GGG AGA	1006
Pro Pro Gly Gln Arg Asn Arg Glu Val Leu Ser Trp Gly Ser Gly Arg	
320 325 330 335	
CAG AGC TCA CCA CGG ATG GGC CAG CCT GGG CCA GGC TCC ATG CCG TCA	1054
Gln Ser Ser Pro Arg Met Gly Gln Pro Gly Pro Gly Ser Met Pro Ser	
340 345 350	
AGA GCT GCT TCT CAC ACT TCA GAT TTC AAC CCG AAC GCT GGC TCA GAC	1102
Arg Ala Ala Ser His Thr Ser Asp Phe Asn Pro Asn Ala Gly Ser Asp	
355 360 365	
CAA AGA GTA GTT AAT GGA GGT GTT CCC TGG CCA TCG CCT TGC CCA TCT	1150
Gln Arg Val Val Asn Gly Gly Val Pro Trp Pro Ser Pro Cys Pro Ser	
370 375 380	
CCT TCC TCT CGC CCA CCT TCT CGC TAC CAG TCA GGT CCC AAC TCT CTT	1198
Pro Ser Ser Arg Pro Pro Ser Arg Tyr Gln Ser Gly Pro Asn Ser Leu	
385 390 395	



CCA	CCT	CGG	GCA	GCC	ACC	CCT	ACA	CGG	CCT	CGT	GCC	GAA	TTC	CTG	CAG	1246
Pro	Pro	Arg	Ala	Ala	Thr	Pro	Thr	Arg	Pro	Arg	Ala	Glu	Phe	Leu	Gln	
400					405					410					415	

CCC GGG GAT CC	1257
Pro Gly Asp	

(2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 418 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

His Glu Gly Pro Leu Thr Met Ser Leu Lys Pro Gln Pro Gln Pro Pro  
1 5 10 15

Ala Pro Ala Thr Gly Arg Lys Pro Gly Gly Gly Leu Leu Ser Ser Pro  
20 25 30

Gly Ala Ala Pro Ala Ser Ala Ala Val Thr Ser Ala Ser Val Val Pro  
35 40 45

Ala Pro Ala Ala Pro Val Ala Ser Ser Ser Ala Ala Ala Gly Gly Gly  
50 55 60

Arg Pro Gly Leu Gly Arg Gly Arg Asn Ser Ser Lys Gly Leu Pro Gln  
65 70 75 80

Pro Thr Ile Ser Phe Asp Gly Ile Tyr Ala Asn Val Arg Met Val His  
85 90 95

Ile Leu Thr Ser Val Val Gly Ser Lys Cys Glu Val Gln Val Lys Asn  
100 105 110

Gly Gly Ile Tyr Glu Gly Val Phe Lys Thr Tyr Ser Pro Lys Cys Asp  
115 120 125

Leu Val Leu Asp Ala Ala His Glu Lys Ser Thr Glu Ser Ser Ser Gly  
130 135 140

Pro Lys Arg Glu Glu Ile Met Glu Ser Val Leu Phe Lys Cys Ser Asp  
145 150 155 160

Phe Val Val Val Gln Phe Lys Asp Thr Asp Ser Ser Tyr Ala Arg Arg  
 165 170 175  
 Asp Ala Phe Thr Asp Ser Ala Leu Ser Ala Lys Val Asn Gly Glu His  
 180 185 190  
 Lys Glu Lys Asp Leu Glu Pro Trp Asp Ala Gly Glu Leu Thr Ala Ser  
 195 200 205  
 Glu Glu Leu Glu Leu Glu Asn Asp Val Ser Asn Gly Trp Asp Pro Asn  
 210 215 220  
 Asp Met Phe Arg Tyr Asn Glu Glu Asn Tyr Gly Val Val Ser Thr Tyr  
 225 230 235 240  
 Asp Ser Ser Leu Ser Ser Tyr Thr Val Pro Leu Glu Arg Asp Asn Ser  
 245 250 255  
 Glu Glu Phe Leu Lys Arg Glu Ala Arg Ala Asn Gln Leu Ala Glu Glu  
 260 265 270  
 Ile Glu Ser Ser Ala Gln Tyr Lys Ala Arg Val Ala Leu Glu Asn Asp  
 275 280 285  
 Asp Arg Ser Glu Glu Glu Lys Tyr Thr Ala Val Gln Arg Asn Cys Ser  
 290 295 300  
 Asp Arg Glu Gly His Gly Pro Asn Thr Arg Asp Asn Lys Tyr Ile Pro  
 305 310 315 320  
 Pro Gly Gln Arg Asn Arg Glu Val Leu Ser Trp Gly Ser Gly Arg Gln  
 325 330 335  
 Ser Ser Pro Arg Met Gly Gln Pro Gly Pro Gly Ser Met Pro Ser Arg  
 340 345 350  
 Ala Ala Ser His Thr Ser Asp Phe Asn Pro Asn Ala Gly Ser Asp Gln  
 355 360 365  
 Arg Val Val Asn Gly Gly Val Pro Trp Pro Ser Pro Cys Pro Ser Pro  
 370 375 380  
 Ser Ser Arg Pro Pro Ser Arg Tyr Gln Ser Gly Pro Asn Ser Leu Pro  
 385 390 395 400  
 Pro Arg Ala Ala Thr Pro Thr Arg Pro Arg Ala Glu Phe Leu Gln Pro  
 405 410 415  
 Gly Asp

(2) INFORMATION FOR SEQ ID NO:6:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 18 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

GGGCCCCTCA CCATGTCG

18

(2) INFORMATION FOR SEQ ID NO:7:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 18 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

CGGGCTTGCG GACATTGG

18

(2) INFORMATION FOR SEQ ID NO:8:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 18 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

CCGCGGCTGC CAATGTCC

18

(2) INFORMATION FOR SEQ ID NO:9:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 18 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

GTAACCGTTC GGC GCCCG

18

(2) INFORMATION FOR SEQ ID NO:10:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 18 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

GGCTCCCGGC GGCTCCTT

18

(2) INFORMATION FOR SEQ ID NO:11:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 23 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

TGCTGCTGCT GCTGGGGCTT CAG

23

(2) INFORMATION FOR SEQ ID NO:12:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 19 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

CCGCCCCGCTC CTCACGTGT

19

(2) INFORMATION FOR SEQ ID NO:13:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 18 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

ACCCCCGAGA AAGCAACC

18

(2) INFORMATION FOR SEQ ID NO:14:

- (i) SEQUENCE CHARACTERISTICS:  
    (A) LENGTH: 18 base pairs  
    (B) TYPE: nucleic acid  
    (C) STRANDEDNESS: single  
    (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

CCGTTGCCGT TGCTACCA

18

(2) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

TTCTCATGTG CGGCATCAAG

20

(2) INFORMATION FOR SEQ ID NO:16:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 346 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

Val	Tyr	Gly	Pro	Leu	Thr	Met	Ser	Leu	Lys	Pro	Gln	Gln	Gln	Gln	Gln
1				5					10					15	
Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln	Gln
			20					25					30		
Gln	Pro	Pro	Pro	Ala	Ala	Ala	Asn	Val	Arg	Lys	Pro	Gly	Gly	Ser	Gly
			35				40					45			
Leu	Leu	Ala	Ser	Pro	Ala	Ala	Ala	Pro	Ser	Pro	Ser	Ser	Ser	Ser	Val
			50				55				60				
Ser	Ser	Ser	Ser	Ala	Thr	Ala	Pro	Ser	Ser	Val	Val	Ala	Ala	Thr	Ser
65					70					75					80
Gly	Gly	Gly	Arg	Pro	Gly	Leu	Gly	Arg	Gly	Arg	Asn	Ser	Asn	Lys	Gly
				85					90					95	
Leu	Pro	Gln	Ser	Thr	Ile	Ser	Phe	Asp	Gly	Ile	Tyr	Ala	Asn	Met	Arg
				100					105					110	

Met	Val	His	Ile	Leu	Thr	Ser	Val	Val	Gly	Ser	Lys	Cys	Glu	Val	Gln	115	120	125	
Val	Lys	Asn	Gly	Gly	Ile	Tyr	Glu	Gly	Val	Phe	Lys	Thr	Tyr	Ser	Pro	130	135	140	
Lys	Cys	Asp	Leu	Val	Leu	Asp	Ala	Ala	His	Glu	Lys	Ser	Thr	Glu	Ser	145	150	155	160
Ser	Ser	Gly	Pro	Lys	Arg	Glu	Glu	Ile	Met	Glu	Ser	Ile	Leu	Phe	Lys	165	170	175	
Cys	Ser	Asp	Phe	Val	Val	Val	Gln	Phe	Lys	Asp	Met	Asp	Ser	Ser	Tyr	180	185	190	
Ala	Lys	Arg	Asp	Ala	Phe	Thr	Asp	Ser	Ala	Ile	Ser	Ala	Lys	Val	Asn	195	200	205	
Gly	Glu	His	Lys	Glu	Lys	Asp	Leu	Glu	Pro	Trp	Asp	Ala	Gly	Glu	Leu	210	215	220	
Thr	Ala	Asn	Glu	Glu	Leu	Glu	Ala	Leu	Glu	Asn	Asp	Val	Ser	Asn	Gly	225	230	235	240
Trp	Asp	Pro	Asn	Asp	Met	Phe	Arg	Tyr	Asn	Glu	Glu	Asn	Tyr	Gly	Val	245	250	255	
Val	Ser	Thr	Tyr	Asp	Ser	Ser	Leu	Ser	Ser	Tyr	Thr	Val	Pro	Leu	Glu	260	265	270	
Arg	Asp	Asn	Ser	Glu	Glu	Phe	Leu	Lys	Arg	Glu	Ala	Arg	Ala	Asn	Gln	275	280	285	
Leu	Ala	Glu	Glu	Ile	Glu	Ser	Ser	Ala	Gln	Tyr	Lys	Ala	Arg	Val	Ala	290	295	300	
Leu	Glu	Asn	Asp	Asp	Arg	Ser	Glu	Glu	Glu	Lys	Tyr	Thr	Ala	Val	Gln	305	310	315	320
Arg	Asn	Ser	Ser	Glu	Arg	Glu	Gly	His	Ser	Ile	Asn	Thr	Arg	Glu	Asn	325	330	335	
Lys	Tyr	Ile	Pro	Pro	Gly	Gln	Arg	Asn	Arg	340	345								

(2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 326 amino acids
- (B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

His	Glu	Gly	Pro	Leu	Thr	Met	Ser	Leu	Lys	Pro	Gln	Pro	Gln	Pro	Pro	
1				5					10					15		
Ala	Pro	Ala	Thr	Gly	Arg	Lys	Pro	Gly	Gly	Gly	Leu	Leu	Ser	Ser	Pro	
			20					25					30			
Gly	Ala	Ala	Pro	Ala	Ser	Ala	Ala	Val	Thr	Ser	Ala	Ser	Val	Val	Pro	
		35					40					45				
Ala	Pro	Ala	Ala	Pro	Val	Ala	Ser	Ser	Ser	Ala	Ala	Ala	Gly	Gly	Gly	
	50					55					60					
Arg	Pro	Gly	Leu	Gly	Arg	Gly	Arg	Asn	Ser	Ser	Lys	Gly	Leu	Pro	Gln	
65					70					75					80	
Pro	Thr	Ile	Ser	Phe	Asp	Gly	Ile	Tyr	Ala	Asn	Val	Arg	Met	Val	His	
				85					90					95		
Ile	Leu	Thr	Ser	Val	Val	Gly	Ser	Lys	Cys	Glu	Val	Gln	Val	Lys	Asn	
			100					105					110			
Gly	Gly	Ile	Tyr	Glu	Gly	Val	Phe	Lys	Thr	Tyr	Ser	Pro	Lys	Cys	Asp	
		115					120					125				
Leu	Val	Leu	Asp	Ala	Ala	His	Glu	Lys	Ser	Thr	Glu	Ser	Ser	Ser	Gly	
	130					135					140					
Pro	Lys	Arg	Glu	Glu	Ile	Met	Glu	Ser	Val	Leu	Phe	Lys	Cys	Ser	Asp	
145					150					155					160	
Phe	Val	Val	Val	Gln	Phe	Lys	Asp	Thr	Asp	Ser	Ser	Tyr	Ala	Arg	Arg	
				165					170					175		
Asp	Ala	Phe	Thr	Asp	Ser	Ala	Leu	Ser	Ala	Lys	Val	Asn	Gly	Glu	His	
			180					185					190			
Lys	Glu	Lys	Asp	Leu	Glu	Pro	Trp	Asp	Ala	Gly	Glu	Leu	Thr	Ala	Ser	
		195					200					205				
Glu	Glu	Leu	Glu	Leu	Glu	Asn	Asp	Val	Ser	Asn	Gly	Trp	Asp	Pro	Asn	
	210					215					220					



Asp Met Phe Arg Tyr Asn Glu Glu Asn Tyr Gly Val Val Ser Thr Tyr  
 225 230 235 240

Asp Ser Ser Leu Ser Ser Tyr Thr Val Pro Leu Glu Arg Asp Asn Ser  
 245 250 255

Glu Glu Phe Leu Lys Arg Glu Ala Arg Ala Asn Gln Leu Ala Glu Glu  
 260 265 270

Ile Glu Ser Ser Ala Gln Tyr Lys Ala Arg Val Ala Leu Glu Asn Asp  
 275 280 285

Asp Arg Ser Glu Glu Glu Lys Tyr Thr Ala Val Gln Arg Asn Cys Ser  
 290 295 300

Asp Arg Glu Gly His Gly Pro Asn Thr Arg Asp Asn Lys Tyr Ile Pro  
 305 310 315 320

Pro Gly Gln Arg Asn Arg  
 325

(2) INFORMATION FOR SEQ ID NO:18:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 275 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

Leu Ala Pro Gln Pro Pro Pro Pro Gln Gln His Gln Glu Arg Pro Gly  
 1 5 10 15

Ala Ala Ala Ile Gly Ser Ala Arg Gly Gln Ser Thr Gly Lys Gly Pro  
 20 25 30

Pro Gln Ser Pro Val Phe Glu Gly Val Tyr Asn Asn Ser Arg Met Leu  
 35 40 45

His Phe Leu Thr Ala Val Val Gly Ser Thr Cys Asp Val Lys Val Lys  
 50 55 60

Asn	Gly	Thr	Thr	Tyr	Glu	Gly	Ile	Phe	Lys	Thr	Leu	Ser	Ser	Lys	Phe	65	70	75	80
Glu	Leu	Ala	Val	Asp	Ala	Val	His	Arg	Lys	Ala	Ser	Glu	Pro	Ala	Gly	85	90	95	
Gly	Pro	Arg	Arg	Glu	Asp	Ile	Val	Asp	Thr	Met	Val	Phe	Lys	Pro	Ser	100	105	110	
Asp	Val	Met	Leu	Val	His	Phe	Arg	Asn	Val	Asp	Phe	Asn	Tyr	Ala	Thr	115	120	125	
Lys	Asp	Lys	Phe	Thr	Asp	Ser	Ala	Ile	Ala	Met	Asn	Ser	Lys	Val	Asn	130	135	140	
Gly	Glu	His	Lys	Glu	Lys	Val	Leu	Gln	Arg	Trp	Glu	Gly	Gly	Asp	Ser	145	150	155	160
Asn	Ser	Asp	Asp	Tyr	Asp	Leu	Glu	Ser	Asp	Met	Ser	Asn	Gly	Trp	Asp	165	170	175	
Pro	Asn	Glu	Met	Phe	Lys	Phe	Asn	Glu	Glu	Asn	Tyr	Gly	Val	Lys	Thr	180	185	190	
Thr	Tyr	Asp	Ser	Ser	Leu	Ser	Ser	Tyr	Thr	Val	Pro	Leu	Glu	Lys	Asp	195	200	205	
Asn	Ser	Glu	Glu	Phe	Arg	Gln	Arg	Glu	Leu	Arg	Ala	Ala	Gln	Leu	Ala	210	215	220	
Arg	Glu	Ile	Glu	Ser	Ser	Pro	Gln	Tyr	Arg	Leu	Arg	Ile	Ala	Met	Glu	225	230	235	240
Asn	Asp	Asp	Gly	Arg	Thr	Glu	Glu	Glu	Lys	His	Ser	Ala	Val	Gln	Arg	245	250	255	
Gln	Gly	Ser	Gly	Arg	Glu	Ser	Pro	Ser	Leu	Ala	Ser	Arg	Glu	Gly	Lys	260	265	270	
Tyr	Ile	Pro														275			

(2) INFORMATION FOR SEQ ID NO:19:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 18 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

CCAATGTCCG CAAGCCCG

18

CI  
cont